# Revised Statement of Basis

# Prevention of Significant Deterioration Permit

# Otter Tail Power Company – Big Stone II

# Big Stone City, South Dakota

**South Dakota Department of Environment and Natural ResourceS**

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## 1.0 Background

On July 20, 2005, Otter Tail Power Company submitted an application for an air quality preconstruction permit under the Prevention of Significant Deterioration program on behalf of Co-Owners of Big Stone II for a nominal 600 megawatt net base load super-critical pulverized coal fired unit and ancillary equipment. Big Stone II will be located on the same property as an existing cyclone fired coal boiler, which will be referred to in this document as Big Stone I. Big Stone I is located near Big Stone City, South Dakota. On August 9, 2005, the Department of Environment and Natural Resources (DENR) considered the application complete. Several exchanges were made between DENR and Otter Tail Power Company during the review process.

The draft Prevention of Significant Deterioration permit was public noticed on April 19, 2006. The normal public comment period of 30 days was extended another 30 days at the request of several entities reviewing the statement of basis and draft permit. The last day comments on the draft permit were accepted was June 18, 2006.

On July 26, 2006, DENR notified those that commented on the draft permit that Otter Tail Power Company submitted an updated application for the Big Stone II project on June 20, 2006, and DENR was extending the comment period. The application noted the following changes in the design of the Big Stone II project:

1. Install a diesel booster pump for the boiler;
2. Install a diesel booster pump for the silos;
3. Install a coal yard transfer system;
4. Install a limestone pre-crusher building;
5. Install an emergency coal stack out system;
6. Modify limestone stack out conveyor so that it is enclosed within a building. This will eliminate Unit #28;
7. Modify limestone day bin vents so that only one baghouse would be used instead of two;
8. Request an operational limit of 500 hours on the pumps and emergency generator;
9. Request a plant wide limit on mercury emissions; and
10. Incorporate the fugitive dust controls in the emission analysis and modeling.

On August 7, 2006, Otter Tail Power Company submitted an update, which consisted of the following information:

1. PM2.5 modeling analysis;
2. The removal of the existing Unit #5 (live fuel storage building transfer point) and Unit #6 (rotary car dumper conveyor);
3. Operational limits of 18 hours per day and 5,000 hours per year for Unit #7 (rotary car dumper), Unit #18, (coal loading), and Unit #30 (emergency coal stock-out system); and
4. The use of biodiesel in Unit #13, #14, #15, #25, and #33.

On February 26, 2007, Otter Tail Power Company submitted an update, which consisted of the following information:

1. Change the description of the boiler to a nominal 630 megawatts;
2. The removal of proposed Unit #18 (coal loading), Unit #19 (coal unloading) and Unit #32 (coal yard transfer system);
3. The addition of Unit #34 (pretreatment soda ash bin vent) and Unit #35 (pretreatment lime bin vent);
4. The relocation of Unit #16 (cooling tower), Unit #17 (emergency coal reclaim hopper), Unit #24 (limestone day bin vent), Unit #33 (coal handling diesel fire pump), and portions of the haul roads;
5. The use of passive dust control on proposed Unit #17 (emergency coal reclaim system), Unit #20 (limestone reclaim system), Unit #21 (limestone receiving system), Unit #22 (coal tripper/silo fill system), Unit #26 (coal plant transfer system), Unit #27 (coal crusher building), and Unit #30 (coal stack out system). A passive dust control system reduces the velocity of air flow rate to allow particulate matter to drop out of the gas stream, which allows for a smaller baghouse to be used; and
6. The modeling for particulate matter and carbon monoxide was run with the updated changes and using AERMOD instead of ISCST3.

On March 6, 2007, Otter Tail Power Company submitted an update, which consisted of the following:

1. The live storage building (ID #5) will be removed during the Big Stone II project; and
2. The rotary car dumper conveyor (ID #6) will be removed during the Big Stone II project.

On July 16, 2007, Otter Tail Power Company submitted an update, which consisted of PM2.5 modeling conducted to demonstrate compliance with the revised PM2.5 National Ambient Air Quality Standards.

On October 8, 2007, Otter Tail Power Company submitted an update, which consisted of a change of ownership and that the maximum net output of the boiler would be 600 megawatts. The project application is being submitted on behalf of the following:

1. Central Minnesota Municipal Power Agency (CMMPA)
2. Heartland Consumers Power District (HCPD)
3. Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc. (MDU)
4. Otter Tail Corporation dba Otter Tail Power Company (OTP); and
5. Western Minnesota Municipal Power Agency (WMMPA)

This review is just for the revised equipment, additional equipment and the affects of that equipment on the modeling results, etc. The reviews such as the BACT analysis for equipment not mentioned in this review are covered by the original statement of basis.

# 2.0 Operational Description

## 2.1 General Process Descriptions

The Big Stone II project will burn subbituminous coal and provide steam for a steam turbine generator with a maximum 600 megawatt net output. The generator will produce electricity for sale.

## 2.2 Changes to New and Existing Equipment

Otter Tail Power Company is proposing to construct the following revised equipment at Big Stone II and modify the existing equipment at Big Stone I. The listed operating rates are the nominal, manufacturer listed, or annual average operating rate noted in the PSD application. The maximum hourly operating rates for the equipment will be submitted with the Title V air quality permit application.

- **Unit #7 –** The process rate will increase from a maximum operating rate of 3,000 tons per hour to a design operating rate of 3,600 tons per hour. Four baghouses will control the air emissions; each will have its own emission point. In addition, Otter Tail Power Company proposes an operational limit of 18 hours per 24 hour period and a maximum of 5,000 hours per 12-month period;
- **Unit #14 –** Fire pump with an operating rate of 420 horsepower. The fire pump will be fired by distillate oil or biodiesel. Otter Tail Power Company proposes a catalyzed diesel particulate filter to control air emissions from this unit. In addition, Otter Tail Power Company proposes an operational limit of 500 hours per 12-month period for this unit;
- **Unit #15 –** Electric generator with an operating rate of 2,220 kilowatts. The generator will be fired by distillate oil or biodiesel. Otter Tail Power Company proposes a catalyzed diesel particulate filter to control air emissions from this unit. In addition, Otter Tail Power Company proposes an operational limit of 500 hours per 12-month period for this unit;
- **Unit #16 –** Cooling tower with 18 cells. The cooling tower will have an operating rate of 312,540 gallons per minute. Otter Tail Power Company proposed to install 0.0005 percent efficient drift eliminators;
- **Unit #25 –**Boiler booster pump with an operating rate of 225 horsepower. The pump will be fired by distillate oil or biodiesel. Otter Tail Power Company proposes a catalyzed diesel particulate filter to control air emissions from this unit. In addition, Otter Tail Power Company proposes an operational limit of 500 hours per 12-month period for this unit;
- **Unit #29 –** Limestone pre-crusher building with an operating rate of 200 tons per hour. Otter Tail Power Company proposes a baghouse to control air emissions from this unit;
- **Unit #30 –** Emergency coal stack out system with an operating rate of 380 tons per hour. Otter Tail Power Company proposes a baghouse to control air emissions from this unit and an operational limit of 18 hours per 24 hour period and a maximum of 5,000 hours per 12-month period;

- **Unit #33 –** Coal area booster pump with an operating rate of 225 horsepower. The pump will be fired by distillate oil or biodiesel. Otter Tail Power Company proposes a catalyzed diesel particulate filter to control air emissions from this unit. In addition, Otter Tail Power Company proposes an operational limit of 500 hours per 12-month period for this unit;
- **Unit #34 –** Pretreatment soda ash bin vent with an operating rate of 20 tons per hour. Otter Tail Power Company proposed a baghouse to control air emissions from this unit; and
- **Unit #35 –** Pretreatment lime bin vent with an operating rate of 20 tons per hour. Otter Tail Power Company proposed a baghouse to control air emissions from this unit.

The following equipment related to Big Stone I will be shutdown once Big Stone II is operational:

- Unit #5 – Live fuel storage building transfer point; and
- Unit #6 – Rotary car dumper conveyor;

The shutdown of Unit #5 and #6 will be specified in Big Stone I's Title V air quality permit.

The following equipment from the draft PSD permit that was public noticed in July 2006 will no longer be installed:

- Unit #18 – Coal loading;
- Unit #19 – Coal unloading; and
- Unit #28 – Limestone stack out conveyor.

## 3.0 Emission Factors

The emission factors for each applicable pollutant are derived from the Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1), Otter Tail Power Company's application, manufacturer information, etc.

## 4.0 Potential Emission Calculations

Potential emissions for each applicable pollutant are calculated based on the design capacity listed in the application and assuming that each unit operates every hour of every day of the year. The annual amount of coal processed and burned is based on the annual average hourly operating rate of the conveying system, which is 380 tons per hour. Equation 4-1 was used to calculate the annual amount of coal processed and burned by Big Stone II.

***Equation 4-1 – Annual Coal Usage at Big Stone II***

$$Potential\ Coal\ Usage = \left(380\frac{tons}{hour}\right)\times\left(8{,}760\frac{hours}{year}\right) = 3{,}328{,}800\frac{tons}{year}$$

The annual amount of limestone processed and consumed is based on the design rate of the conveying systems, which is rated at 11 tons per hour. Equation 4-2 was used to calculate the annual amount of limestone processed and consumed by Big Stone II.

***Equation 4-2 – Annual Limestone Usage at Big Stone II***

$$Potential\ \ Limestone\ Usage = \left(11\frac{tons}{hour}\right)\times\left(8{,}760\frac{hours}{year}\right) = 96{,}360\frac{tons}{year}$$

## 4.1 Potential Uncontrolled Emissions

The uncontrolled emission calculations assumes that every piece of equipment would be in operation 24 hours a day, 365 days a year, and without the use of air pollution control devices. As noted in Section 2.2, some emission units will not operate 24-hours per day or 365 days a year. Table 4-1 displays the potential uncontrolled emissions for the proposed 600 megawatt coal-fired electric generation facility. The exercise of calculating potential uncontrolled emissions is necessary for determining what air quality permits are required and in no means reflects what would actually be emitted by the facility.

***Table 4-1 – Big Stone II Potential Uncontrolled Emissions***

| Unit | Description | TSP (tons/yr) | PM10 (tons/yr) | $SO_2$ (tons/yr) | $NO_X$ (tons/yr) | VOC (tons/yr) | CO (tons/yr) |
|---|---|---|---|---|---|---|---|
| **Point Sources (New)** | | | | | | | |
| **#13** | **Boiler** | 106,920.0 | 21,384.0 | 56,700.0 | 11,988.0 | 81.0 | 810.0 |
| **#14** | **Fire pump** | 4.1 | 4.1 | 3.8 | 55.2 | 4.6 | 12.3 |
| **#15** | **Generator** | 11.0 | 11.0 | 29.2 | 267.2 | 16.0 | 81.7 |
| **#16** | **Cooling tower [1]** | 20.5 | 20.5 | - | - | - | - |
| **#17** | **Coal reclaim system** | 101.6 | 101.6 | - | - | - | - |
| **#20** | **Limestone reclaim hopper** | 90.2 | 90.2 | - | - | - | - |
| **#21** | **Limestone receiving hopper** | 75.3 | 75.3 | - | - | - | - |
| **#22** | **Plant coal transfer and silo fill system** | 533.5 | 533.5 | - | - | - | - |
| **#23** | **Fly ash silo bin vent** | 67.5 | 67.5 | - | - | - | - |
| **#24** | **Limestone day bin vent #1** | 2.6 | 2.6 | - | - | - | - |
| **#25** | **Boiler booster pump** | 2.2 | 2.2 | 2.1 | 29.6 | 2.5 | 6.6 |
| **#26** | **Coal transfer conveyor** | 67.5 | 67.5 | - | - | - | - |

| Unit | Description | TSP (tons/yr) | PM10 (tons/yr) | $SO_2$ (tons/yr) | $NO_X$ (tons/yr) | VOC (tons/yr) | CO (tons/yr) |
|---|---|---|---|---|---|---|---|
| **#27** | **Coal crusher house** | 225.1 | 225.1 | - | - | - | - |
| **#29** | **Limestone pre-crusher building** | 1.0 | 1.0 | - | - | - | - |
| **#30** | **Coal stock out system** | 149.8 | 149.8 | - | - | - | - |
| **#33** | **Silo booster pump** | 3.3 | 3.3 | 3.1 | 44.7 | 3.7 | 10.0 |
| **#34** | **Pretreatment soda ash bin vent** | 5.3 | 5.3 | - | - | - | - |
| **#35** | **Pretreatment lime bin vent** | 5.3 | 5.3 | - | - | - | - |
| **Permit #28.0801-29 – Existing Point Sources** | | | | | | | |
| **#7** | **Rotary car dump building** | 57.9 | 57.9 | - | - | - | - |
| **Fugitive Sources** | | | | | | | |
| | **Truck traffic, wind erosion, etc.** [1] | 56.4 | 56.4 | - | - | - | - |
| | **Total Uncontrolled Emissions** | **108,400** | **22,864** | **56,738** | **12,385** | **108** | **921** |

[1] – The emission estimates were taken directly from Otter Tail Power Company's application.

## 5.0 New Source Performance Standards

DENR reviewed the new source performance standards (NSPS) for the revised and/or new equipment and determined that the following may be applicable to the Big Stone II project. The review for the other equipment that was not changed due to this revised application was discussed in the previous statement of basis.

### 5.1 ARSD 74:36:07:16 – 40 CFR Part 60, Subpart Y

The provisions of this subpart are applicable to the following units and processes in coal preparation plants that commence construction or modifications after October 24, 1974: thermal dryers, pneumatic coal cleaning equipment, coal processing and conveying equipment, coal storage systems, and coal transfer and loading systems. Table 5-1 lists the Big Stone II units that are applicable to 40 CFR, Part 60, Subpart Y.

***Table 5-1 – Unit applicable to 40 CFR Part 60, Subpart Y***

| Unit | Description |
|---|---|
| **#7** | Rotary car dump building |
| **#17** | Coal reclaim system |
| **#22** | Plant transfer and silo fill system |
| **#26** | Transfer conveyor |
| **#27** | Coal crusher house |

| | |
|---|---|
| **#30** | Coal stock out system |

Unit #7 is not applicable to this subpart until Unit #7 is modified during the construction of the proposed project.

Otter Tail Power Company's proposed project does not have thermal dryers or pneumatic coal cleaning equipment. Therefore, the only emission limit for the units listed in Table 5-1 is a 20 percent opacity limit.

## 5.2 40 CFR, Part 60, Subpart IIII

This subpart was finalized July 11, 2006, and is applicable to each stationary compression ignition internal combustion engine that commenced construction, modification, or reconstruction after July 11, 2005. The pumps (Unit #14, #25, and #33) and the generator (Unit #15) are applicable to this subpart. Table 5-2 displays the emission limits.

***Table 5-2– 40 CFR Part 60, Subpart IIII Emission Limits***

| Pollutant | Pump (Unit #14, #25, and #33) | Generator (Unit #15) |
|---|---|---|
| **Particulate Matter** | 0.15 grams per horsepower-hour | 0.15 grams per horsepower-hour |
| **Carbon Monoxide** | 2.6 grams per horsepower-hour | 2.6 grams per horsepower-hour |
| **Nitrogen Oxide and Non-Methane Organic Compounds [1]** | 3.0 grams per horsepower-hour | 4.8 grams per horsepower- hour |

[1] – The nitrogen oxide and non-methane organic compound limits is a combined limit and not a separate limit for each pollutant

## 5.3 ARSD 74:36:07:27 – 40 CFR Part 60, Subpart OOO

The provisions of this subpart are applicable to the following units and processes in a nonmetallic mineral processing plant that commence construction or modifications after August 31, 1983: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. Table 5-3 lists the Big Stone II units that are applicable to 40 CFR, Part 60, Subpart OOO.

***Table 5-3 – Units applicable to 40 CFR Part 60, Subpart OOO***

| Unit | Description |
|---|---|
| **#20** | Limestone reclaim conveyor |
| **#21** | Limestone receiving hopper |
| **#24** | Limestone day bin vent #1 |
| **#29** | Limestone pre-crusher building |

The emission limit for the units listed in Table 5-3 is 0.022 grains per dry standard cubic foot and a 7 percent opacity limit.

## 6.0 National Emission Standards for Hazardous Air Pollutants

Presently, there are no finalized or promulgated National Emissions Standards for Hazardous Air Pollutants standards for the type of operations used by Otter Tail Power Company's Big Stone II project.

## 7.0 Maximum Achievable Control Technology Standards

On March 29, 2005, EPA issued a final rule in the federal register that removes coal and oil-fired electric utility steam generating units from the requirements of Section 112 of the federal Clean Air Act. Therefore, a Case-by-Case MACT review is not required.

## 8.0 Acid Rain Program

In accordance with 40 CFR §§ 72.6 and 72.7, a new coal fired unit serving a generator greater than 25 megawatts is applicable the Acid Rain Program. Therefore, Otter Tail Power Company's Big Stone II project is applicable to the Acid Rain Program. In accordance with 40 CFR § 72.30, Otter Tail Power Company is required to submit an acid rain permit application 24 months prior to Big Stone II commencing operation.

## 9.0 New Source Review

ARSD 74:36:10:01 notes that new source review regulations in this chapter apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. Big Stone II will be located near Big Stone City, South Dakota, which is in attainment for all the pollutants regulated under the Clean Air Act. Therefore, Big Stone II is not subject to the new source review requirements in this chapter.

## 10.0 Prevention of Significant Deterioration

A prevention of significant deterioration (PSD) review applies to new major stationary sources and major modifications to existing major stationary sources in areas designated as attainment under Section 107 of the Clean Air Act for any regulated pollutant. The following is a list of regulated pollutants under the PSD program:

- Total suspended particulate (TSP);
- Particulate matter with a diameter less than or equal to 10 microns (PM10);

- Particulate matter with a diameter less than or equal to 2.5 microns (PM2.5)
- Sulfur dioxide (SO2);
- Nitrogen oxides (NOx);
- Carbon monoxide (CO);
- Ozone – measured as volatile organic compounds (VOCs);
- Lead;
- Fluorides;
- Sulfuric acid mist;
- Hydrogen sulfide;
- Reduced sulfur compounds; and
- Total reduced sulfur.

If the source is considered one of the 28 named PSD source categories listed in Section 169 of the federal Clean Air Act, the major source threshold is 100 tons per year of any regulated pollutant. The major source threshold for all other sources is 250 tons per year of any regulated pollutant.

Big Stone II is considered a fossil fueled boiler with a heat input greater than 250 million Btus per hour, which is one of the 28 named PSD source categories. Once a source is considered major for a given pollutant all the other regulated pollutants are compared to the significant threshold to determine if the other regulated pollutants are subject to a PSD review. Big Stone II's proposed operations will require a PSD review for particulate matter, sulfur dioxide, nitrogen oxide, carbon monoxide, volatile organic compounds, lead, fluorides, and sulfuric acid mist.

### 10.1 Sulfur Dioxide and Nitrogen Oxide Exemption

In the public notice phase, EPA and the Sierra Club submitted comments that the limitations for the sulfur dioxide and nitrogen oxide emissions to allow the Big Stone II project to forgo a PSD review should not be included in the PSD permit. DENR will remove the sulfur dioxide and nitrogen oxide limitations from the PSD permit and place it in Otter Tail Power Company's Title V air quality permit. The sulfur dioxide and nitrogen oxide emission limits in the Title V air quality permit will allow Big Stone II to forgo a PSD review for these air pollutants.

### 10.2 Best Available Control Technology (BACT) Analysis

In accordance with 40 CFR § 52.21(j), a new major source shall apply best available control technology (BACT) for each pollutant subject to regulation under the federal Clean Air Act for which it would result in significant net emissions at the source. As noted in Section 112(b)(6) of the federal Clean Air Act, hazardous air pollutants are not covered by the PSD program. Based on Table 10-1, a BACT analysis is required for particulate matter, carbon monoxide, volatile organic compounds, lead, sulfuric acid mist, and fluoride emissions.

***Table 10-1 – Regulated Air Pollutants Significant Emission Comparison***

| Pollutant | Potential Uncontrolled Emissions | Significant Rate | PSD Review |
|---|---|---|---|

| Pollutant | Potential Uncontrolled Emissions | Significant Rate | PSD Review |
|---|---|---|---|
| **PM [1]** | 108,400 tons/year | 25 tons/year | **Yes** |
| **PM10** | 22,864 tons/year | 15 tons/year | **Yes** |
| **Sulfur dioxide** | [2] | 40 tons/year | No |
| **Nitrogen oxide** | [2] | 40 tons/year | No |
| **Carbon monoxide** | 921 tons/year | 100 tons/year | **Yes** |
| **Ozone (measured as VOC)** | 108 tons/year | 40 tons/year | **Yes** |
| **Lead [3]** | 13 tons/year | 0.6 tons/year | **Yes** |
| **Fluorides [3]** | 243 tons/year | 3 tons/year | **Yes** |
| **Sulfuric acid mist [3]** | 2,628 tons/year | 7 tons/year | **Yes** |
| **Hydrogen sulfide [3]** | Negligible | 10 tons/year | No |
| **Reduced sulfur compounds [3]** | Negligible | 10 tons/year | No |
| **Total reduced sulfur [3]** | Negligible | 10 tons/year | No |

[1] – "PM" means total suspended particulate matter;
[2] - As noted in Section 10.1, Otter Tail Company has proposed enforceable limits to maintain sulfur dioxide and nitrogen oxide emissions such that there will be no net increase for these pollutants. Therefore, a BACT analysis for sulfur dioxide and nitrogen oxide is not required because there will be less than a 40 ton per year increase over previous actual emissions; and
[3] – The emissions for these air pollutants are not impacted by the revisions and were derived from the original statement of basis for Big Stone II.

The BACT requirement applies to each individual new or modified affected emissions unit and pollutant emitting activity at which a net emissions increase would occur. The BACT analysis consists of determining the best available controls and establishing an emissions limit (including a visible emission standard) based on the maximum degree of reduction achievable for each pollutant subject to a regulation under the federal Clean Air Act. The BACT analysis is determined on a case-by-case basis taking into account energy, environmental, and economic impacts, and other costs. BACT is achievable through application of production processes or available methods, systems, and techniques, including fuel cleaning, treatment or innovative fuel combustion techniques for control of such pollutant. In no case shall application of BACT result in an emission limit for any pollutant that would be greater than the emission limit allowed by any applicable standard under 40 CFR Parts 60 and 61. If DENR determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reduction achievable by the implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The BACT analysis is based on four steps. The first step consists of identifying all available control options for the pollutant under consideration. Available control options are those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Air pollution control technologies and techniques include the application of production process or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant.

The second step consists of evaluating the technical feasibility of the various control options in relationship to the specific unit under consideration. A demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emissions unit under review.

In the third step, all remaining control techniques identified in step 1 and not eliminated by step 2 are ranked and then listed in order of over all control effectiveness for the pollutant under review. The technically feasible options are reviewed in a top-down approach. A top-down approach means the best control measures will be evaluated first and if they are not feasible, the next best control measure will be evaluated. In this step, the control efficiency, the expected emission rate, the expected emission reduction, and the cost, environmental, and energy impacts for each control option are evaluated.

In the final step, the BACT analysis should focus on the direct impact of the control alternatives for the particular pollutant under review. The top alternative in the BACT analysis should be reviewed to determine whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. This process continues until the technology under consideration cannot be eliminated by a source specific environmental, energy, or economic impacts which demonstrate that alternative to be inappropriate as BACT.

It should be noted that the first three steps are unnecessary if the applicant proposes installing the top control option. In such cases, the applicant should document for the public record that the control option chosen is the top and review for collateral environmental impacts.

### 10.2.1 BACT Analysis for Particulate Matter

There are no design changes to the heat input, operational rates, etc. for Unit #7, #13, #16, #23, #24. In addition, there is no change for the fugitive source analysis. Therefore, the BACT analysis and BACT limits for these units and fugitive sources will not be revisited during this review and is noted in the original statement of basis.

The BACT determination under this review for particulate matter emissions shall be conducted for Unit #14, #15, #17, #20, #21, #22, #25, #26, #27, #29, #30, #33, #34, and #35. Since lead is emitted as a particulate matter, the BACT analysis for particulate matter will satisfy that BACT analysis for lead. In addition, a BACT analysis will be conducted for the operations that emit fugitive dust.

### 10.2.1-1 Identifying Options for Controlling Particulate Matter Emissions

Otter Tail Power Company identified a baghouse as the top option for controlling particulate matter emissions from Unit #17, #20, #21, #22, #26, #27, #29, #30, #34, and #35. DENR agrees that a baghouse is the top control for these types of operations. Since Otter Tail Power Company is proposing to install a baghouse on each of these units, the BACT analysis will consist of determining a particulate matter emission limit.

Otter Tail Power Company supplemented its application by providing DENR with a memo from Robynn Andracsek (Burns & McDonnell) to Terry Graumann (Otter Tail Power Company) dated February 2, 2006. In the memo, Burns & McDonnell provides Otter Tail Power Company with a PM10 BACT analysis for the diesel fired emergency fire pump (Unit #14) and electric generator (Unit #15). In the analysis, Burns & McDonnell identified catalyzed diesel particulate filters used in conjunction with ultra low sulfur diesel, a baghouse, and an electrostatic precipitator for controlling particulate matter from Unit #14 and #15.

In the June 20, 2006, application, Otter Tail Power Company identified the catalyzed diesel particulate filter used in conjunction with ultra low sulfur diesel, a baghouse, and an electrostatic precipitator as BACT for Unit #25 and #33.

### 10.2.1-2 Technical Feasibility for Controlling Particulate Matter Emissions

Otter Tail Power Company believes all of the options it mentioned in the application are technically feasible except for using a baghouse or electrostatic precipitator to control particulate matter from Unit #14, #15, #25 and #33. In the Burns & McDonnell memo to Terry Graumann dated February 2, 2006, Burns & McDonnell believes that the exit gas temperatures for these units prohibits the use of a baghouse or electrostatic precipitator for controlling particulate matter emissions. DENR agrees with Otter Tail Power Company's technically feasible analysis.

### 10.2.1-3 Top Down Approach for Particulate Matter Emissions

DENR agrees that the top approach for controlling particulate matter emissions from Unit #14 #15, #25 and #33 is a catalyzed diesel particulate filter used in conjunction with ultra low sulfur diesel in accordance with the New Source Performance Standard, 40 CFR Part 60, Subpart IIII. Otter Tail Power Company has agreed to install this system on Unit #14 #15, #25 and #33.

Otter Tail Power Company is also requesting that they be permitted to burn biodiesel in these units. Biodiesel typically contain minimal amounts of sulfur and may be considered an ultra low sulfur fuel. Therefore, DENR will also allow Otter Tail Power Company to use biodiesel in Unit #14, #15, #25, and #33.

### 10.2.1-4 BACT Determination for Particulate Matter

Table 10-2 displays Otter Tail Power Company's proposed particulate matter emission limits for the appropriate unit.

*Table 10-2 – Proposed BACT Limits for Particulate Matter Emissions*

| Unit | Description | Control Option | Particulate Size | BACT Limit |
|---|---|---|---|---|
| **#14** | Fire pump fired with ultra low sulfur diesel and biodiesel | Catalyzed diesel particulate filter | TSP | NSPS, 40 CFR Part 60, Subpart IIII |
| **#15** | Generator fired with ultra low sulfur diesel and biodiesel | Catalyzed diesel particulate filter | TSP | NSPS, 40 CFR Part 60, Subpart IIII |
| **#17** | Coal reclaim system | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#20** | Limestone reclaim conveyor | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#21** | Limestone receiving hopper | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#22** | Plant transfer/silo fill system | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#25** | Boiler booster pump fired with ultra low sulfur diesel and biodiesel | Catalyzed diesel particulate filter | TSP | NSPS, 40 CFR Part 60, Subpart IIII |
| **#26** | Transfer conveyor | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#27** | Coal crusher house | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#29** | Limestone pre-crusher building | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#30** | Coal stack out system | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#33** | Silo booster pump fired with ultra low sulfur diesel and biodiesel | Catalyzed diesel particulate filter | TSP | NSPS, 40 CFR Part 60, Subpart IIII |
| **#34** | Pretreatment soda ash bin vent | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |
| **#35** | Pretreatment lime bin vent | Baghouse | PM10 | 0.01 grains per standard cubic foot (filterable) [1] |

[1] – The application does not specifically state that the limit is based on filterable. The material handling sources are operated at atmospheric conditions; therefore, there is no condensable particulate.

Table 10-3 displays a comparison of the BACT limits for particulate matter compared to the applicable new source performance standard limits for particulate matter. The proposed particulate matter emission limits for Otter Tail Power Company's Big Stone II project are equal to or lower than the new source performance standard. It should be noted that total suspended particulate (TSP) and particulate matter 10 microns in diameter or less (PM10) do not necessarily have the same meaning. However, in the instances of combustion sources and sources controlled by a baghouse, a majority of the TSP is PM10. Therefore, the emission rates are quite similar.

***Table 10-3 – Comparison of BACT and NSPS Particulate Matter Limits***

| Unit | BACT Limit | NSPS Limit |
|---|---|---|
| **#14** | PM10 – 0.15 grams per horsepower-hour | TSP – 0.15 grams per horsepower-hour |
| **#15** | PM10 – 0.15 grams per horsepower-hour | TSP – 0.15 grams per horsepower-hour |
| **#17** | PM10 – 0.01 grains per standard cubic foot | 20% opacity – not comparable |
| **#20** | PM10 – 0.01 grains per standard cubic foot | TSP – 0.022 grains per dry standard cubic foot |
| **#21** | PM10 – 0.01 grains per standard cubic foot | TSP – 0.022 grains per dry standard cubic foot |
| **#22** | PM10 – 0.01 grains per standard cubic foot | 20% opacity – not comparable |
| **#25** | PM10 – 0.15 grams per horsepower-hour | TSP – 0.15 grams per horsepower-hour |
| **#26** | PM10 – 0.01 grains per standard cubic foot | 20% opacity – not comparable |
| **#27** | PM10 – 0.01 grains per standard cubic foot | 20% opacity – not comparable |
| **#29** | PM10 – 0.01 grains per standard cubic foot | TSP – 0.022 grains per dry standard cubic foot |
| **#30** | PM10 – 0.01 grains per standard cubic foot | 20% opacity – not comparable |
| **#33** | PM10 – 0.15 grams per horsepower-hour | TSP – 0.15 grams per horsepower-hour |
| **#34** | PM10 – 0.01 grains per standard cubic foot | No NSPS limit |
| **#35** | PM10 – 0.01 grains per standard cubic foot | No NSPS limit |

October 23, 1997, a memo from John Seitz, EPA stated that until PM2.5 implementation tools were available, that permitting authorities should use PM10 as a surrogate for PM2.5 in meeting the PSD requirements. On April 5, 2005, a memo from Stephen Page, EPA reaffirmed the October 23, 1997, memo that permitting authorities should use PM10 as a surrogate for PM2.5 in meeting the PSD requirements. In addition, the PM2.5 modeling that Otter Tail Power Company has conducted assumed that all the PM10 emissions were PM2.5 for the point sources. Since PM2.5 is a subset of PM10, the BACT particulate matter limit as PM10 is adequate and no additional BACT limit for PM2.5 is necessary.

### 10.2.2 BACT for Carbon Monoxide

There are no design changes to the heat input, operational rates, etc. for Unit #13. Therefore, the BACT analysis and BACT limits for Unit #13 will not be revisited during this review and is noted in the original statement of basis.

The BACT determination under this review for carbon monoxide emissions shall be conducted for Unit #14, #15, #25, and #33.

#### 10.2.2-1 Identifying Options for Carbon Monoxide

Otter Tail Power Company only considered combustion control methods for controlling carbon monoxide emissions. DENR concurs that no add on control equipment is documented in the RACT/BACT/LAER Clearinghouse maintained by EPA and that combustion control techniques is the single identified option for controlling carbon monoxide emissions. Since this is the top and only option, a technically feasible and top down review is not necessary.

#### 10.2.2-2 BACT Determination for Carbon Monoxide

DENR concurs with Otter Tail Power Company that BACT for carbon monoxide from the new combustion sources should be good combustion practices. Table 10-4 displays Otter Tail Power Company's proposed BACT limits for carbon monoxide based on good combustion practices in accordance with the New Source Performance Standard, 40 CFR Part 60, Subpart IIII.

***Table 10-4 – Proposed BACT Limits for Carbon Monoxide Emissions***

| Unit | Description | Control Option | BACT Limit |
|---|---|---|---|
| **#14** | Fire pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#15** | Generator | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#25** | Boiler booster pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#33** | Silo booster pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |

DENR was unable to find BACT limits for carbon monoxide from the pumps and electric generator similar to the proposed units at Big Stone II. Therefore, DENR recommends the carbon monoxide limits be as stringent as the carbon monoxide limits in the proposed NSPS standard. The proposed carbon monoxide limit is 2.6 grams per horsepower-hour.

### 10.2.3 BACT for Volatile Organic Compounds

There are no design changes to the heat input, operational rates, etc. for Unit #13. Therefore, the BACT analysis and BACT limits for Unit #13 will not be revisited during this review and is noted in the original statement of basis.

The BACT determination under this review for volatile organic compound emissions shall be conducted for Unit #14, #15, #25, and #33.

#### 10.2.3-1 Identifying Options for Volatile Organic Compounds

Otter Tail Power Company only considered combustion control methods for controlling volatile organic compound emissions. DENR concurs that no add on control equipment is documented in the RACT/BACT/LAER clearinghouse maintained by EPA and that combustion control techniques is the single identified option for controlling volatile organic compound emissions. Since this is the top and only option, a technically feasible and top down review is not necessary.

### 10.2.3-2 BACT Determination for Volatile Organic Compounds

DENR concurs with Otter Tail Power Company that BACT is good combustion practices. With the finalization of the New Source Performance Standard under 40 CFR Part 60, Subpart IIII, Otter Tail Power Company requested the volatile organic compound BACT limits be the same as this subpart. This subpart limits the emissions of nitrogen oxide and non-methane organic compounds as a combined limit. In addition, Otter Tail Power Company has requested a 500 hour operational limitation on these units. Therefore, DENR agrees that this new source performance standard shall constitute BACT for volatile organic compounds.

Table 10-5 displays Otter Tail Power Company's proposed volatile organic compound BACT emission limits for the appropriate unit in accordance with the New Source Performance Standard under 40 CFR Part 60, Subpart IIII.

***Table 10-5 – Proposed BACT Limits for Volatile Organic Compound as Carbon Emissions***

| Unit | Description | Control Option | BACT Limit |
|---|---|---|---|
| **#14** | Fire pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#15** | Generator | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#25** | Boiler booster pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |
| **#33** | Silo booster pump | Good combustion practices | NSPS, 40 CFR Part 60, Subpart IIII |

### 10.2.4 Startup, Shutdown, or Malfunctions BACT

The BACT emission limitations apply during periods of startup, shutdown, or malfunctions, except for Unit #13, #14 #15, #25, and #33. BACT allows if a technological or economic limitation on the application of measurement methodology would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement. Direct compliance with the proposed emission limits will be based on performance tests. These tests are not conducive to be conducted during startup, shutdown, or malfunctions. Therefore, during these periods, BACT will be good work and maintenance practice and manufacturer's recommendation to minimize emissions during startup, shutdown, or malfunction events.

## 10.3 Air Quality Analysis

The air quality analysis must satisfy the following three criteria before the construction of a major source or major modification to a major source under the PSD program can be approved:

1. The air quality analysis must determine if the PSD de minimis monitoring levels are triggered, which would require preconstruction ambient air quality monitoring;

2. The air quality analysis must demonstrate that the BACT emission limits from the proposed project added with the background concentrations for each pollutant will not cause a violation of any applicable National Ambient Air Quality Standards (NAAQS); and
3. The BACT emission limits from the proposed project do not exceed any applicable PSD Class I or II increments.

In previous submittals, Otter Tail Power Company conducted its air dispersion modeling analysis using ISCST3. Since those submittals, EPA has approved a more recent model called AMS/EPA regulatory Model (AERMOD). Therefore, Otter Tail Power Company performed the most recent air dispersion modeling analysis using the AERMOD model (Version 07026) with regulatory defaults. The AERMOD model is an EPA-approved, steady state, Gaussian plume air dispersion model that is designed to estimate downwind concentrations from single or multiple industrial sources.

As noted in Appendix W of 40 CFR Part 51, five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred. Surface air meteorological data from Huron, South Dakota (#14936) and upper air data from Aberdeen, South Dakota (#14929) from 2001 to 2005 were incorporated into the analysis.

Table 10-6 lists the units, stack locations and stack parameters that were used in the model. Big Stone I was included in this analysis to determine the cumulative impact of both units on the National Ambient Air Quality standards.

***Table 10-6 – Project Modeled Parameters***

| Unit | Description of Unit | Northing Feet | Easting Feet | Stack Height Feet (ft) | Stack Diameter Feet (ft) | Exit Temp F | Exit Velocity ft/s |
|---|---|---|---|---|---|---|---|
| **Existing Units – Big Stone I** | | | | | | | |
| **#1** | 1975 Babcock & Wilcox generator | 2280523 | 16467253 | 498.0 | 34.0 | 138 | 29.7 |
| **#2** | 1973 CE combustion steam boiler | 2281298 | 16467715 | 85.0 | 6.5 | 606.0 | 21.1 |
| **#3** | 1961 Bros steam heating boiler | 2281257 | 16467675 | 90.0 | 4.0 | 525.0 | 26.0 |
| **#4** | 1974 WPS emergency generator | 2281305 | 16467701 | 23.0 | 1.0 | 880.0 | 0.3 [1] |
| **#7** | Rotary car dumper building | 2280718 | 16467508 | 150 | 6.9 | - | 64.4 |
| **#8** | Fuel transfer house | 2280846 | 16467970 | 125 | 1.6 | - | 61.0 |
| **#9** | North fuel conveying system and silo vents | 2281349 | 16467672 | 128.0 | 2.2 | - | 0.3 [1] |
| **#10** | South fuel conveying system, silo vents, and plant distribution | 2281268 | 16467585 | 128.0 | 2.8 | - | 0.3 [1] |

| Unit | Description of Unit | Northing Feet | Easting Feet | Stack Height Feet (ft) | Stack Diameter Feet (ft) | Exit Temp F | Exit Velocity ft/s |
|---|---|---|---|---|---|---|---|
| | bin | | | | | | |
| **#11** | Fly ash storage silo | 2280940 | 16467356 | 113 | 1.1 | - | 0.3 [1] |
| **#12** | Lime Storage Silo | 2281343 | 16467849 | 51 | 0.6 | - | 0.3 [1] |
| **New Units – Big Stone II** | | | | | | | |
| **#13** | Boiler | 2280523 | 16467253 | 498 | 34.0 | 137 | 63.6 |
| **#14** | Fire pump | 2282300 | 16467275 | 15 | 0.8 | 904 | 76.6 |
| **#15** | Generator | 2281263 | 16467182 | 15 | 1.5 | 900 | 100.4 |
| **#16** | Cooling tower [2] | 2281816 | 16466125 | 60 | 33.0 | 61 | 39.6 |
| **#17** | Coal Reclaim System | 2280355 | 16467874 | 25 | 1.5 | - | 63.7 |
| **#20** | Limestone reclaim hopper | 2280420 | 16467036 | 20 | 1.5 | - | 56.6 |
| **#21** | Limestone receiving hopper | 2280258 | 16466778 | 30 | 1.4 | - | 54.1 |
| **#22** | Plant transfer/silo fill system | 2281165 | 16467431 | 279 | 3.8 | - | 53.6 |
| **#23** | Fly ash silo bin vent | 2280898 | 16467315 | 105 | 1.9 | - | 52.9 |
| **#24** | Limestone day bin vent | 2280674 | 16467198 | 128 | 1.3 | - | 0.3 [1] |
| **#25** | Boiler booster pump | 2281055 | 16467303 | 11 | 0.7 | 749 | 55.8 |
| **#26** | Transfer conveyor | 2280344 | 16468043 | 20 | 1.3 | - | 59.2 |
| **#27** | Crusher house | 2280510 | 16468020 | 95 | 2.3 | - | 60.2 |
| **#29** | Limestone precrusher building | 2280576 | 16466834 | 85 | 1.0 | - | 0.3 [1] |
| **#30** | Coal stock out system | 2280236 | 16467590 | 110 | 1.8 | - | 55.9 |
| **#33** | Silo booster pump | 2280555 | 16468035 | 11 | 0.7 | 749 | 55.8 |
| **#34** | Pretreatment soda ash bin vent | 2280813 | 16466632 | 60 | 0.7 | - | 0.3 [1] |
| **#35** | Pretreatment lime bin vent | 2280794 | 16466627 | 60 | 0.67 | - | 0.3 [1] |

[1] – The actual exit velocity is greater than 0.3 feet per second, however, the 0.3 feet per second indicates the discharge is horizontal or is obstructed; and
[2] – The parameters listed for the cooling tower are for each cell of the cooling tower. Only the first cell's northing and easting coordinates are listed.

The Big Stone II project triggered a PSD modeling review for particulate matter and carbon monoxide. It should be noted that there is no NAAQS or PSD increment for sulfuric acid mist or fluorides, that there is no EPA approved model to model the impacts of volatile organic compounds (ozone) for a single source, and that the Big Stone II project proposed limits to forgo a PSD review for nitrogen oxide and sulfur dioxide Additionally, sources located outside of an ozone nonattainment area are presumed to have no significant impact on the nonattainment area pursuant to 40 CFR Part 51 Appendix S, III, C.

During the comment period for the original draft PSD permit, the Sierra Club commented that a modeling analysis for PM2.5 should be conducted. EPA adopted a National Ambient Air Quality Standard for PM2.5 and it became effective on September 16, 1997. On October 23, 1997, John S. Seitz, Director Office of Air Quality Planning and Standards, issued a memorandum to Regional Air Directors that states that PM10 modeling should be used as a surrogate until the technical difficulties with ambient monitoring and modeling in regards to PM2.5 is resolved. On April 5, 2005, Stephen D. Page, Director, issued a memorandum that reaffirmed the previous memo stating PM10 should still be used a surrogate. As EPA notes in its memorandums, it is impractical to administer a PM2.5 PSD review at this time.

However, Otter Tail Power Company did conduct an air quality analysis in regards to direct emissions of PM2.5. Otter Tail Power Company assumed that the PM2.5 emission rates for the point sources (stacks) were equivalent to the PM10 emission rates. Table 10-7 summarizes the emission rates for particulate matter and carbon monoxide used in the modeling.

***Table 10-7 – Modeled Emission Rates (pounds per hour)***

| Unit | Description | PM2.5/PM10 (Short Term) | PM2.5/PM10 (Long term) | CO |
|---|---|---|---|---|
| **#1** | Babcock & Wilcox Generator | 1,508 | 1,508 | 458.2 |
| **#2** | Combustion Steam Boiler | 2.1 | 2.1 | 7.5 |
| **#3** | Bros steam heating boiler | 1.0 | 1.0 | 3.5 |
| **#4** | WPS emergency generator | 0.9 | 0.9 | 7.4 |
| **#7** | Rotary car dumper building | 9.5 | 7.2 | - |
| **#8** | Fuel transfer house | 3.2 | 3.2 | - |
| **#9** | North fuel conveying system | 1.2 | 1.2 | - |
| **#10** | South fuel conveying system | 1.4 | 1.4 | - |
| **#11** | Fly ash storage silo | 0.4 | 0.4 | - |
| **#12** | Lime Storage Silo | 0.1 | 0.1 | - |
| **#13** | Boiler | 180 | 180 | 900.0 |
| **#14** | Fire pump | 0.1 | 0.01 | 2.4 |
| **#15** | Generator | 0.7 | 0.04 | 12.7 |
| **#16** | Cooling Tower | 0.3 per cell | 0.3 per cell | - |
| **#17** | Emergency Reclaim Hopper | 0.6 | 0.6 | - |
| **#20** | Limestone Reclaim Hopper | 0.6 | 0.6 | - |
| **#21** | Limestone Receiving Hopper | 0.5 | 0.5 | - |
| **#22** | Plant Transfer / Silo Fill System | 3.0 | 3.0 | - |
| **#23** | Fly Ash Silo Bin Vent | 0.9 | 0.9 | - |
| **#24** | Limestone Day Bin Vent #1 | 0.3 | 0.3 | - |
| **#25** | Boiler booster pump | 0.1 | 0.004 | 1.3 |
| **#26** | Transfer conveyor | 0.4 | 0.4 | - |
| **#27** | Crusher house | 1.3 | 1.3 | - |
| **#29** | Limestone pre-crusher building | 0.2 | 0.2 | - |

| Unit | Description | PM2.5/PM10 (Short Term) | PM2.5/PM10 (Long term) | CO |
|---|---|---|---|---|
| **#30** | Coal stock out system | 0.7 | 0.7 | - |
| **#33** | Silo booster pump | 0.1 | 0.004 | 1.3 |
| **#34** | Pretreatment soda ash bin vent | 0.1 | 0.1 | |
| **#35** | Pretreatment lime bin vent | 0.1 | 0.1 | |

### 10.3.1 Deminimis Monitoring Levels

Preconstruction ambient monitoring is used to determine the background concentration prior to a new source or new modification being constructed. As allowed in 40 CFR § 52.21(i)(8)(i), modeling of just the proposed project for the pollutants that triggered a PSD review may be conducted to determine if the proposed BACT emission limits would exceed the deminimis monitoring levels. If the deminimis monitoring levels are not exceeded, preconstruction ambient monitoring is not required. Table 10-8 compares the modeling results for particulate matter and carbon monoxide to the significant impact levels to determine if preconstruction monitoring is required.

***Table 10-8 – PSD Class II Significant Monitoring Impact Levels***

| Pollutant | Big Stone II Project Modeled Impact ($ug/m^3$) | Significant Impact Level ($ug/m^3$) | Monitoring Required |
|---|---|---|---|
| **PM10 (24-hour)** | 30 | 10 | **Yes** |
| | | | |
| **CO (8-hour)** | 106 | 575 | No |

Based on the modeling analysis, preconstruction ambient monitoring is required for PM10 to determine the background PM10 concentrations. Otter Tail Power Company fulfilled the monitoring requirement by performing preconstruction PM10 monitoring north of the proposed facility from October 2001 through October 2002. Even though not required, Otter Tail Power Company also conducted preconstruction monitoring for sulfur dioxide, nitrogen oxide and meteorological parameters.

### 10.3.2 National Ambient Air Quality Standards

Based on EPA's draft guidance, *New Source Review Workshop Manual*, October 1990, if the maximum modeled impact for the proposed project does not exceed the Class II significant impact levels then EPA does not require any further National Ambient Air Quality standards or PSD Class II increment analyses for that pollutant. On December 18, 2006, the annual PM10 national ambient air quality standard was vacated. Even though this standard was vacated, DENR will review this vacated standard. Table 10-9 displays a comparison of the maximum modeled concentrations to the significant impact levels for particulate matter and carbon monoxide.

*Table 10-9 – PSD Class II Significant Modeling Impact Levels*

| Pollutant | Big Stone II Project Modeled Impact ($ug/m^3$) | Significant Impact Level ($ug/m^3$) | Further Analysis Required |
|---|---|---|---|
| **PM10 (24-hour)** | 30 | 5 | **Yes** |
| **PM10 (annual)** | 5 | 1 | **Yes** |
| | | | |
| **CO (1-hour)** | 228 | 2000 | No |
| **CO (8-hour)** | 106 | 500 | No |

The modeled concentration for the Big Stone II project does not exceed the carbon monoxide significant modeling impact levels. Therefore, no further modeling review is required for carbon monoxide.

Based on the Class II significant impact level review, the National Ambient Air Quality standards review is necessary for PM10. As required in 40 CFR § 52.21(d), the analysis was conducted to determine if the project would exceed the National Ambient Air Quality standards for PM10. The highest modeled PM10 concentration from both the existing units and from the proposed project was added to the background concentration to compare to the National Ambient Air Quality standards. Table 10-10 displays the comparison of the modeled impacts to the National Ambient Air Quality standards and demonstrates that the PM10 National Ambient Air Quality standards will not be exceeded.

*Table 10-10 – National Ambient Air Quality Standards Comparison for Particulate Matter*

| Pollutant | Big Stone II Project and Big Stone I Modeled Impact ($ug/m^3$) | Monitored Background ($ug/m^3$) | Total Impact ($ug/m^3$) | NAAQS ($ug/m^3$) | NAAQS Violation |
|---|---|---|---|---|---|
| **PM2.5 (24-hour)** | 17.3 | 17 [1] | 34.3 | 35 | No |
| **PM2.5 (annual)** | 6.7 | 8 [1] | 14.7 | 15 | No |
| | | | | | |
| **PM10 (24-hour)** | 61.3 | 32.0 [2] | 93.3 | 150 | No |
| **PM 10 (annual)** | 26.4 | 12.1 [2] | 38.5 | 50 | No |

[1] – Based on a third standard deviation comparison of PM2.5 and PM10 emissions from monitoring sites in South Dakota to the 2002 ambient monitoring data (1st Max) north of Big Stone I; and
[2] – Based on 2002 ambient monitoring data (1st Max) north of Big Stone I.

Otter Tail Power Company modeled the roads at the Big Stone I and II site as if they were paved. Therefore, the PSD permit will require the roads to be paved.

DENR concluded the air emissions from the proposed facility will not cause a violation of the National Ambient Air Quality standards for PM2.5 and PM10.

### 10.3.3 Increment Consumption

Otter Tail Power Company is proposing to construct Big Stone II in Grant County. DENR has not received a PSD application for this county. In addition, the closest area that has been triggered under the PSD program is approximately 90 miles southwest of the proposed location (Volga, Brookings County). South Dakota Soybean Processors triggered the baseline area for the Brookings County area. The impact area of South Dakota Soybean Processors was within a few miles of its location. Therefore, Big Stone II is the only source that needs to be reviewed for increment consumption.

In accordance with 40 CFR § 52.21(c), Big Stone II must demonstrate that the PSD Class II increments for PM10 will not be exceeded. Table 10-11 displays the amount of increments consumed based on the BACT emission limits that will be placed in the permit for the new units and the PM10 emission limits that will be required for the existing units.

***Table 10-11 – PM10 Increment Consumption***

| Pollutant | Model Results (ug/m3) | PSD Class II Increments | | Increments Consumed |
|---|---|---|---|---|
| | | Amount (ug/m3) | Remaining (ug/m3) | |
| **PM10 (24-hour)** | 29.98 [1] | 30[2] | 0.02 | No |
| **PM10 (annual)** | 4.4 | 17 | 12.6 | No |

[1] – Represents the highest 2nd high impact.
[2] – Can be exceeded once per year.

Based on this analysis, the proposed facility will not exceed the PSD increments for PM10 and allows for economic growth in the area.

### 10.3.4 Class I Area Impacts

The models that are used to determine impacts for a Class I area are valid up to approximately 300 kilometers. Otter Tail Power Company's Big Stone II project is located near Big Stone City, South Dakota, which is greater than 300 kilometers away from any Class I area. Therefore, a Class I Area analysis was not required.

DENR notified the National Park Service in writing on January 8, 2002, of the proposed project and via email on April 4, 2005. The National Park Service confirmed that no modeling analysis was warranted in an email dated April 12, 2005.

## 10.4 Other Impacts

### 10.4.1 Visibility

Otter Tail Power Company performed a visibility analysis on the Big Stone II project for the Pipestone National Monument in southwestern Minnesota by using the VISCREEN model. Maximum PM10 emissions of 788 tons per year and nitrogen oxide emissions of 1,840 tons per year were entered into the VISCREEN model. The visibility analysis indicated that if annual emissions comply with the above levels, no adverse visibility impacts will occur. It should be noted that the modeling for visibility took into account that there would be an increase of 1,840 tons of nitrogen oxide per year even though the nitrogen oxide emissions for the facility will be limited to zero tons per year increase. In addition, the BACT limits for particulate matter will result in the potential controlled emissions less than 788 tons per year. Therefore, a specific annual particulate matter and nitrogen oxide emission limit on Big Stone II is not warranted.

### 10.4.2 Commercial, Residential, and Industrial Growth

The Big Stone II project is expected to increase employment in the area during the four year construction phase. Construction will result in approximately 700 workers over the course of the building phase. The completion of the Big Stone II project is projected to generate 35 full time jobs tied directly to the Big Stone II operations. Residential and commercial growth resulting from the facility will result in secondary air emissions but are not expected to significantly impact air quality.

### 10.4.3 Soils and Vegetation

The soils and vegetation impacts analysis is part of the PSD program, therefore, Otter Tail Power Company was not required to consider the impacts on soil and vegetation from sulfur dioxide and nitrogen oxide emissions. The PSD application, nevertheless, considered those emissions and notes that sulfur dioxide and nitrogen oxide will have detrimental effects on many plant species at specific concentration levels. Common plants in eastern South Dakota include oaks, raspberries, American elm, soybean, tomatoes, corn, oats, sunflowers, etc.

The applications note that plants such as the ones noted above are impacted at sulfur dioxide concentrations greater than 131 micrograms per cubic meter for 8 hours, 1,310 micrograms per cubic meters for 4 hours, and 393 micrograms per cubic meters for 2 hours. The ambient air impact analysis indicates that the predicted sulfur dioxide emission impacts based on the plant wide emission limit for sulfur dioxide will be lower than those noted impact concentrations.

Nitrogen dioxide deposition has been found to have similar detrimental effects on vegetation as that of sulfur dioxide with long term exposure doses of 280 micrograms per cubic meter and higher. Expected nitrogen dioxide impacts from Big Stone II are expected to be significantly lower than 280 micrograms per cubic meter based on the plant wide emission limit for nitrogen oxide.

Particulate matter deposition can create detrimental effects on vegetation by smothering the plant and reducing the amount of sunlight available for photosynthesis. Particulate matter emissions are expected to increase by only 5 micrograms per cubic meter so smothering is unlikely to occur.

Carbon monoxide is not known to injure plants.

DENR does not anticipate any adverse impacts on soils and terrestrial vegetation in this area from this project.

## 11.0 State Requirements

### 11.1 Title V air quality permit

Any source operating in South Dakota that meets the requirements of Administrative Rules of South Dakota (ARSD) 74:36:05:03 is required to obtain a Title V air quality permit. Otter Tail Power Company's Big Stone II project is required to obtain a Title V air quality permit because their potential criteria pollutant air emissions are greater than 100 tons per year. In accordance with the ARSD 74:36:05:03.01, Otter Tail Power Company's Big Stone II project is required to submit an application for a Title V air quality permit within 12 months after commencing operation.

### 11.2 State particulate matter, sulfur dioxide, and opacity requirements

South Dakota has established particulate matter, sulfur dioxide, and opacity emission limits in ARSD 74:36:06. In accordance with ARSD 74:36:06:01, the particulate matter and sulfur dioxide emission limits in ARSD 74:36:06 are not applicable if a particulate matter and sulfur dioxide emission limit specified in ARSD 74:36:07 (NSPS program) or in ARSD 74:36:09 (PSD program) are applicable. Otter Tail Power Company is obtaining a PSD permit for the Big Stone II project. In Big Stone II's PSD application, Otter Tail Power Company is proposing particulate matter limits for the proposed equipment. In addition, Big Stone II is required to meet sulfur dioxide limits under the NSPS regulations. Therefore, South Dakota's particulate matter and sulfur dioxide emission limits are not applicable to Unit #13 through #35.

In accordance with ARSD 74:36:12:01, the Big Stone II project is required to maintain visible emissions from the permitted equipment at less than 20 percent opacity.

## 12.0 Recommendation

Based on the information submitted in the air permit application, DENR recommends conditional approval of a PSD permit. Any questions pertaining to this permit recommendation should be directed to Kyrik Rombough, Natural Resources Engineering Director.